the velocity of the flow cannot be computed from a knowledge of the slope. The character of the ground over which the rain falls—that is, the degree of permeability—is a fruitful source of uncertainty in predicting the probable rise. There are many other obvious sources of error, so that no one can be surprised to learn that the theoretical determination of a river rise cannot be treated as a problem in hydraulics. Without a system of gauges along the river, predictions are scarcely possible. With their employment, the problem becomes more or less one of practice and experience. This remark may be illustrated by showing how the rise of the river may be predicted for Pittsburg, a place where the observations of rainfall simply, are of little use in foretelling with accuracy the height to which the river will rise. The rise is predicted from observations of the rise at stations above the town, or on tributaries. Gauges are maintained at Oil City, Brookville, Confluence, Rowlesburg, Weston, and Johnstown. These towns lie both north and south of Pittsburg, and the greatest separation may amount to two hundred miles. The height of the river and its tributaries at each of these places not only exercises a different effect at Pittsburg, presumed to be proportional to the square root of the areas drained by the rivers at each station, but the height of the river at Pittsburg itself has also to be taken into the account. The higher the stage at Pittsburg, the less will the river be affected by the same rise at the upper stations. "It is assumed that the rise multiplied by the mean stage during the rise is comparable throughout different stages for Pittsburg." The factors deduced from the area drained vary from 2·1 for Oil City to 0·1 at Weston, and the observed rise between two consecutive days multiplied by these factors can be easily tabulated to exhibit the expected rise at Pittsburg. Mr. Russell has worked out some examples to show the successful application of this method. On February 16, 1891, the calculated height of the stage was 31·3 feet; the observed, 32 feet. On February 6, 1893, the calculated height was 23 feet; the observed, 23·1. It does not appear how far these examples are illustrative of the success attending the general application, but the system seems to leave nothing to be desired. The author takes us regularly down the Ohio River to Cincinnati, Louisville, and Cairo, the junction with the Mississippi, illustrating the modifications which varying conditions may render necessary. The Missouri and the Mississippi also receive their share of attention, and the book forms a very practical guide for those interested in such matters. The value of the whole process rests on the provision of a sufficient number of well-placed gauges, and a long series of observations, from which may be learnt the probable behaviour of the river under all circumstances. It is in this direction, apparently, that Mr. Russell, of Sydney, finds his opportunity, and the great mass of facts that he is collecting will be of the greatest use as the colony becomes more thickly peopled. We do not understand that he has yet arrived at the stage of predicting with accuracy and confidence the vertical rise and fall of the rivers over which he watches. His part, if apparently less interesting, is not less useful; and he is to be congratulated on the spread of his system of observations and his successful overthrow of many difficulties.

AN ALBUM OF CLASSICAL ANTIQUITIES.

Atlas of Classical Antiquities. By Th. Schreiber. Edited for English use, by Prof. W. C. Anderson, of Firth College, Sheffield. (London: Macmillan, 1895.)

THIS work should hardly be called an Atlas, since, though it contains a vast amount of matter, the disjointed arrangement is by no means that of an Atlas. The abundance of illustrations, however, makes the book exceedingly valuable to the student.

But although there may be, and is the *facundia*, the *lucidus ordo* is frequently wanting. Still, by the help of the excellent trilinqual index, supplied by the English editor, this defect is much remedied.

The book should also be judged by reference to what it aims to be. If considered as a work addressed to artists or specialists, great deficiencies in the technical execution of the plates would have to be complained of; but it should be looked at mainly as a series of rough sketches of ancient life as revealed to us through art, for the instruction of students in literature and commencing archæologists, or as a general book of reference. The above remarks refer entirely to Herr Schreiber's plates; nothing but praise should be accorded to Prof. Anderson as translator and expositor. The aim of the work is sufficiently stated in the preface.

"There springs up a desire for facts—facts as to the life of the ancients, their laws and their customs, their beliefs and their cults. Because no fact is despicable from the point of view of science, we further look into their daily life—the fashion of their dress and their houses, the arrangements of the theatre and the market-place. And since no source of facts can be so perfectly trustworthy as the works of contemporary art, those works gain an interest, arising not merely from their own beauty, but as the crystallisation of the visible life of the people, a mirror of their thought preserved to us like many actual Greek mirrors in the graves of the dead."

The series of plates begins with theatres and acting; and with respect, at least, to Roman or Romanised Greek theatres, they are very fully illustrated, both as regards the fabric and the actor, but there is a remarkable absence of the characteristics of the Greek theatre as distinguished from the Roman, which have been much under discussion of late years. Plate iii., Fig. 3, however, introduces a representation of the raised stage or λογεῖον, which, if the date ascribed to it in the text be accurate, bears strongly against the theory that all the action took place on the level of the orchestra until the raised *pulpitum* was introduced by the Romans. In Plate ix. we see that some of our modern building appliances have been in continuous use since classical times. In Plate x., Fig. 3, after Durm, the contrivance of the wooden blocks and pin in the joints of the columns of the Parthenon is not accurately shown, and it is therefore not surprising that in the text a difficulty is hinted at. The smaller shallow circle was not provided for the purpose of receiving a wooden cylinder to turn in. This was the function of the smaller pin or cylinder of hard wood, which was centred in the square wooden blocks which were fixed in each bed of the joint. The shallow circle in the stone was provided to receive the detritus caused by rubbing the stones together. In the same plate ornament is shown on the echinus of the Doric capital.

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Decoration of this member is, to say the least, extremely doubtful. Two valuable plates follow of Olympia, in plan and perspective. The restored view of the Acropolis of Athens, however, is hardly so successful. The drawing is coarse, and it gives a very inadequate idea of the way in which the Acropolis dominates the valley to the south of it. In Plate xiv., Figs. 1 and 2 (the latter from a vase) are interesting from their connection with the Eleusinian mysteries. As many of the illustrations are necessarily taken from vases, it would have been serviceable for beginners if some representation with a short description of different kinds of vases, such as the cylix, the lecythus, &c., had been given. Plate xv. shows that votive offerings of models of diseased limbs and other bodily members, suspended at the altars of favourite saints, had their origin in classical times. In its reference to Fig. 2, of Plate xviii., the text gives a valuable reference to the recent discoveries at the Pantheon, which were lately made under the direction of the French architect, M. Chedanne.

Plate xix., Fig. 15, is interesting as showing that the division of the heavens into different *houses* of the mediæval astrologers had its origin in classical augury. Plates xx. to xxiv. are devoted to athletics. In Plate xxii. are illustrations of the method of throwing javelins by means of the *amentum*, a kind of sling attached to the shaft. Some are shown as being thrown overhand, and others underhand, and a curious method by which aid was given to jumping by means of weights held in the hands. Plates xxvii. to xxxiii. are devoted to games and arena combats. Fig. 4 in the first of these plates, from a wall-painting from Pompeii, is an interesting illustration, described thus in the text: "This painting is unique as a contemporary picture of an historical event. Tacitus ("Annals," xiv. 17) mentions a riot between the people of Nuceria and Pompeii which arose out of a gladiatorial show given by Livineius Regulus. It began with mutual taunts, and then stones were thrown and weapons used. The Pompeians were naturally the stronger party, so that many of the Nucerians were badly wounded, and several slain. As a consequence, Nero stopped the games for ten years. The painting shows the fighting going on in and about the amphitheatre." Fig. 1 in Plate xxxiii., from Brescia, shows that combats with wild beasts were still practised in 530 A.D. in Italy. In Plate xxxiv. we have representations of early Greek warriors and weapons, and also, but of later date, a besieged city from the Nereid tomb in the British Museum, and in Plate xli. a useful diagram showing the arrangement of a Roman camp. In the same and following plates Roman soldiers and their armour are well given, and Greek and other helmets. Young students of Cæsar "de Bello Gallico" will be thankful for the illustrations of the Rhine Bridge in Plate xliv. In Plate xlvi. is the difficult subject of the trireme and its oars. It contains only one original document (Fig. 8), namely, the sculptured relief found near the Erechtheum; the other figures are reconstructions in which the difficulty does not appear to have been grasped. The ancient relief certainly implies oars of different lengths; thus much cannot be controverted, but the only possible means by which the rowers on the different banks could have kept time would have been by an inversely corresponding difference given to the surface of the blades of the oars, which the reconstructions do not show.

Plates xlviiii. to li. are occupied by town gateways and fortifications. Then follow private houses, aqueducts, bridges, baths, and calculating boards. In Plate lxii. ancient sundials, which divided the day from rising to setting sun into twelve hours, irrespective of the difference of their lengths in summer or winter. Then follow various agricultural operations, and in Plate lxvi. a warehouse scene, the weighing silphium, a plant used in medicine, grown in Cyrene; a group of decidedly Egyptian type. Then ovens, Plate lxvii., for baking bread; Plate lxviii., for pottery. From Plates lxix. to lxxvi., various arts and crafts. The triclinium is shown and explained in Plate lxxvii. Then follows jugglery and games. Plate lxxxi. shows bridal scenes, followed by female dresses and costumes. In Plate lxxxvii. is a relief from the arch of Constantine, introducing several details of the Roman forum. Plate lxxxviii. follows with a graphic scene of civic life from a wall-painting of Pompeii. Then school scenes are illustrated with wax tablets and writing materials; there is also a pair of proportional compasses, having much analogy to the instrument in modern use. Plates xcii. A and xciii. tell the "tale of Troy divine," from a relief of the Augustan age, representing the Iliupersis, found near Bovillae; and the work concludes with a very complete series of burial scenes—that is, of interment—for there are no representations of cremation. But notwithstanding this and some other omissions, the hundred crowded plates of this volume, from which we have made only a few extracts, contain a vast store of objects for reference, and they are all very much enhanced in value by the descriptions and notes with which Mr. Anderson has enriched the book.

A DESIDERATUM IN MODERN BOTANICAL LITERATURE.

A Hand-book of Systematic Botany. By Dr. E. Warming, Professor of Botany in the University of Copenhagen. With a Revision of the Fungi, by Dr. G. Knoblauch, Karlsruhe. Translated and edited by M. C. Potter, M.A., F.L.S., Professor of Botany in the University of Durham College of Science, Newcastle-upon-Tyne. (London: Swan Sonnenschein and Co., 1895.)

IT is a curious, and not altogether a pleasant reflection, considering the activity which has been displayed by the botanists of this country within recent years, that we should still be largely dependent on foreign sources for our text-books in more than one main division of this particular science. It is doubtless true that the books are sometimes more or less edited, before they are presented to the English student, but still one can hardly help feeling that an entirely home-grown article, if issuing from first-rate hands, would prove a most welcome change.

It is with somewhat mixed feelings, then, that we greet the appearance of Prof. Warming's "Hand-book of Systematic Botany" in its English form. Moreover, we feel a little inclined at the very outset to quarrel with the title of the book before us; a *hand-book* of systematic botany embodying critical morphological discussion, is exactly what is now wanted—something which may be to us what Eichler's celebrated *Blüthendiagramme* was, and

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